LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

CROOKED CREEK RESERVOIR

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

June 2013 - Prepared by Jody David, Biologist Manager,
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February 2018 – Prepared by Jody David, Biologist Manager,
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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers with the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Anglers are also afforded the opportunity to catch quality sized largemouth bass through the introduction of Florida largemouth bass. Frequent introductions of Florida largemouth bass provide the foundation for quality and memorable bass through the incorporation of genetic material into the bass population.

Commercial

A commercial fishery does not exist on Crooked Creek Reservoir.

Species of special concern

No threatened or endangered species have been observed in Crooked Creek Reservoir.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations for all fish species, the recreational fishing regulations may be viewed at the link: http://www.wlf.louisiana.gov/regulations

Commercial

Commercial Fishing is prohibited; however, the commercial fishing regulations may be viewed at the link: http://www.wlf.louisiana.gov/regulations

Species of Special Concern

NA

SPECIES EVALUATION

Recreational

Largemouth bass (*Micropterus salmoides*) are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain and because they are highly sought after by anglers. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish. Sampling with gill nets determines the status of large bass and other large fish species.

Largemouth Bass-

Abundance and relative weight-

The index used to measure relative abundance over time is that of catch-per-unit-of-effort (CPUE) based on the number of bass sampled per hour of electrofishing time/effort. The CPUE for largemouth bass collected from Crooked Creek Reservoir from 2002 to 2017 indicates a wide degree of variability in some years (e.g., 2004 compared to 2010 - Figure 1). Electrofishing sampling is conducted during daytime hours on this waterbody. The number of sample sites is determined by the total acres of a water-body. Three sites are sampled on Crooked Creek Reservoir, each representing different habitat types such as aquatic vegetation edges, shoreline, and timber. As indicated in Figure 1, the abundance of all size groups of bass was lowest in 2002 and 2004. The highest total CPUE was in the 2015 sample. The low CPUE could be related to extremely low conductivity levels, which limit the effectiveness of electrofishing gear. Another factor affecting sampling on Crooked Creek was the abundance of dense submerged vegetation. The introduction of triploid grass carp (TGC) reduced submerged vegetation and should improve efficiency of electrofishing sampling efforts.

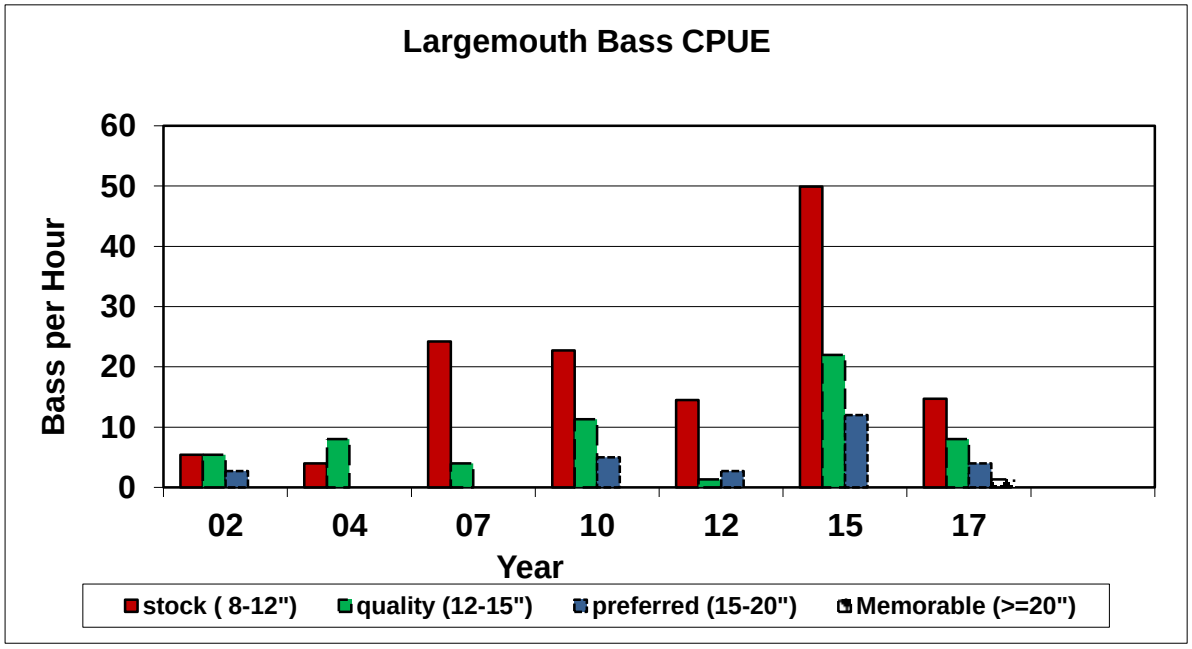

Figure 1. Spring Electrofishing Catch-Per-Unit-of-Effort (CPUE: number per hour) for largemouth bass of stock-, quality-, preferred-, and memorable-size fish captured at Crooked Creek Reservoir, LA, for years 2002 - 2017.

Community fish Assemblage and Forage

Sunfish and gizzard shad have been identified as primary bass forage in Crooked Creek Reservoir. During fall electrofishing, a 900-second sample is used to determine forage abundance. However, there is a difference between forage abundance and availability. Measurements of largemouth bass body condition are recorded to determine utilization of available forage. Relative weight (Wr) is a measure of fish "plumpness", and is the ratio of the fish weight to that of a determined standard weight for healthy fish. Largemouth bass Wr below 80 may indicate a potential problem with forage availability, while Wr near or above 100 indicates a healthy bass population. Crooked Creek Reservoir is often heavily infested with submersed aquatic plants. High densities of submersed aquatic plants usually favor prey species which utilize cover to elude predators. Despite the abundance of prey cover and visual barriers, the relative weights for Crooked Creek Reservoir largemouth bass average near 92 across all size groups (Figure 2). Few largemouth bass were collected in some years due to the heavy infestations of submerged aquatic plants. For example, the number of fish sampled in 2002 was only six bass. In other years, the sample size ranged from 20 – 33 largemouth bass.

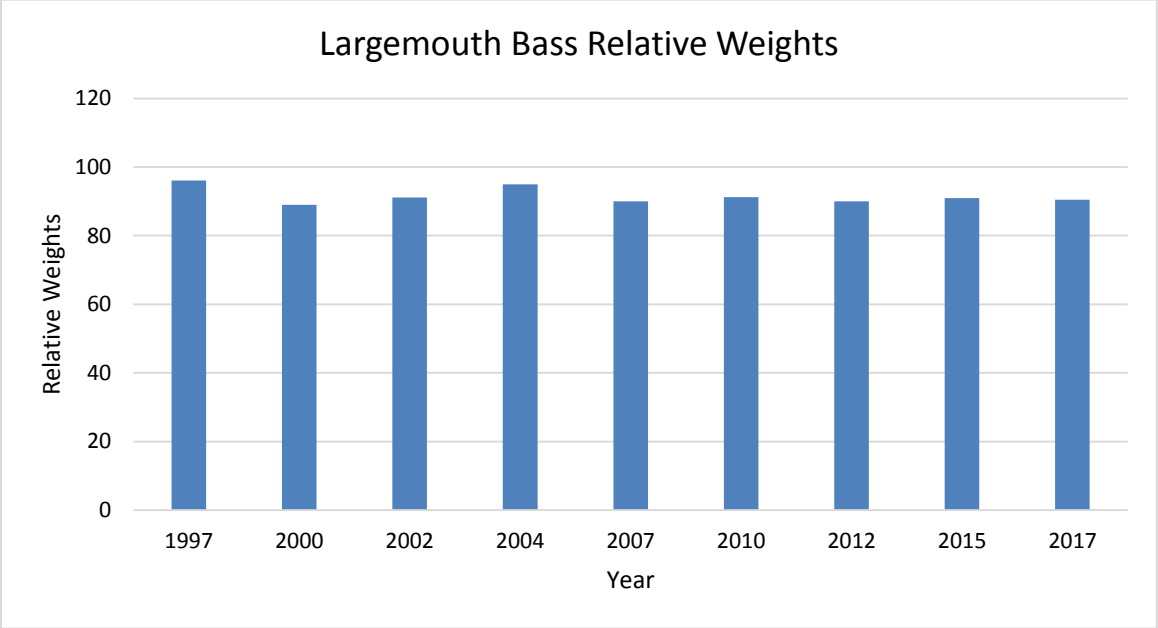

Figure 2. The average relative weights (Wr) of largemouth bass collected in fall electrofishing samples from Crooked Creek Reservoir, LA, for the years 1997 – 2017.

Crappie-

Size structure and relative abundance -

While both species of crappie are found in Crooked Creek Reservoir, the black crappie is far more abundant than the white crappie. Electrofishing samples, taken in the spring and fall from 2004 - 2017 (Figure 3), show crappie size distribution ranging from 2 - 14 inches' total length (TL). Though overall numbers are relatively low, a good size distribution is generally represented over time.

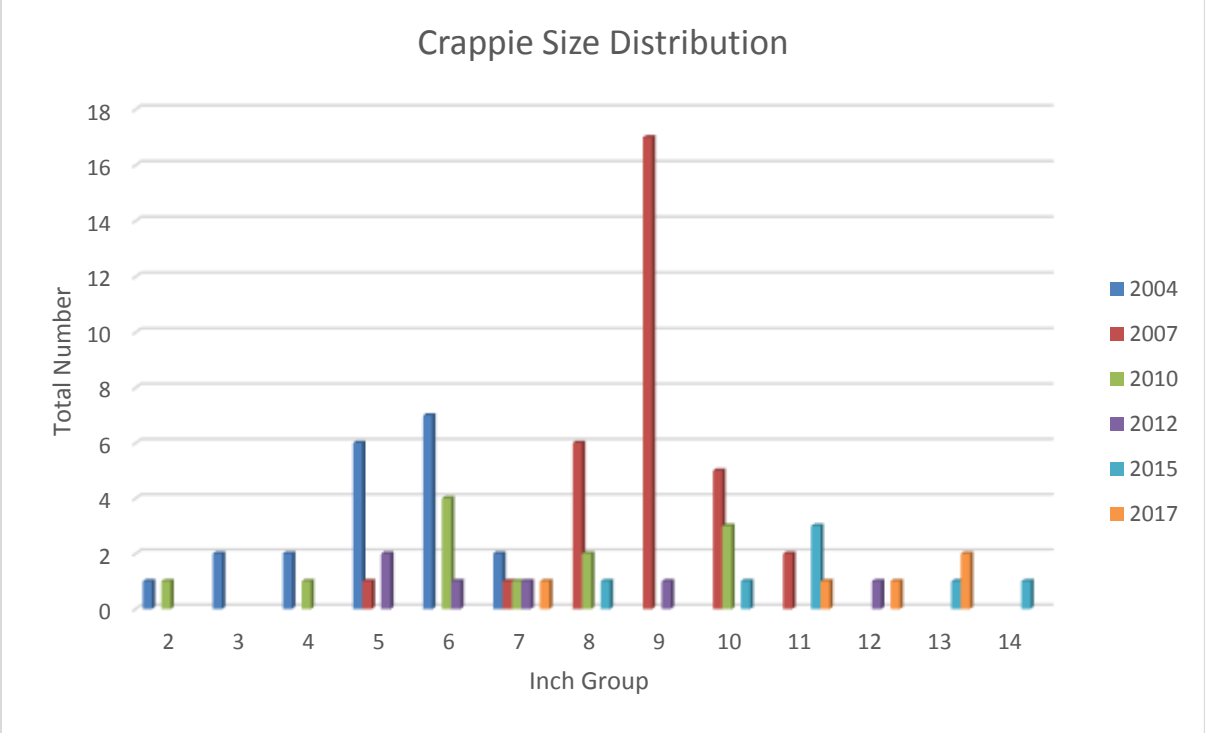

Figure 3. The size distribution of crappie over time captured in electrofishing samples on Crooked Creek Reservoir, LA during the years 2004 - 2017.

CPUE for crappies sampled from Crooked Creek Reservoir by electrofishing samples between the years 1997-2017, indicates annual variability (Figure 4). In the years 1997, 2000 and 2002, there were few captured. Crappie CPUE increased in 2007 and in 2010, but declined in 2012 - 2017. Overall, crappie catch rates in electrofishing samples are relatively low. However, anecdotal information from local anglers indicates otherwise. Good catches are reported, particularly during the spawning season. Frame net sampling was conducted in 2000. Sample size was low. Lead net sampling is scheduled for 2018.

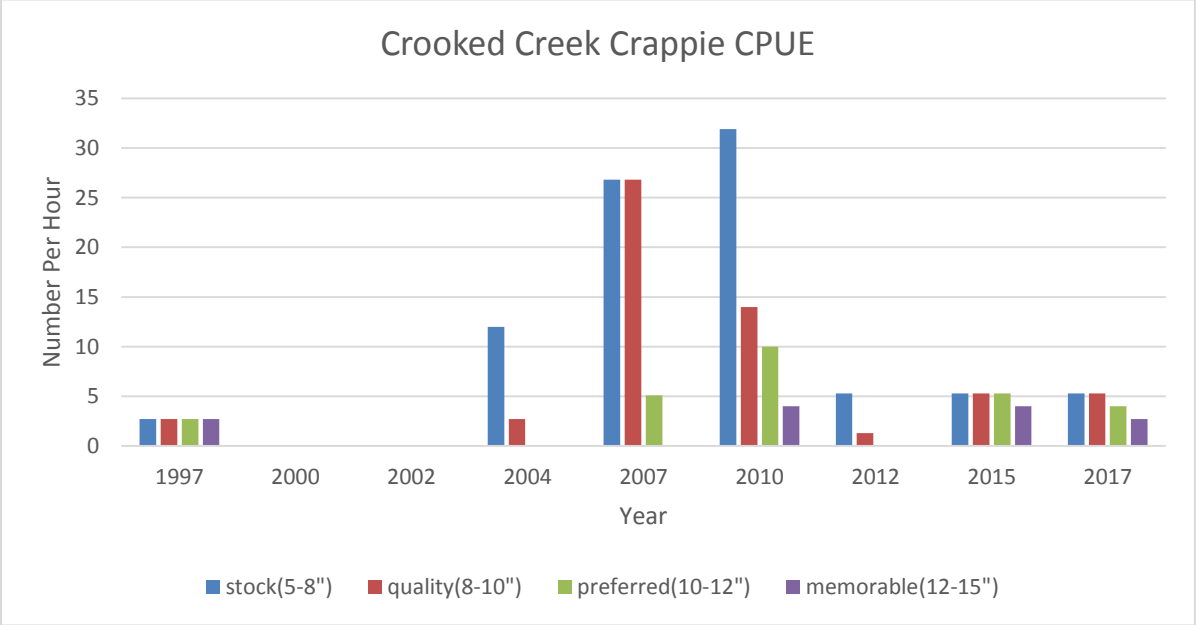

Figure 4. The CPUE (number per hour) by size class for crappies of stock-, quality-, preferred-, and memorable-size fish captured at Crooked Creek Reservoir, LA, during the years from 1997-2017.

Sunfish-

Electrofishing is the primary sampling gear used in Crooked Creek Reservoir for sunfish. Electrofishing results are not reliable to determine sunfish relative abundance.

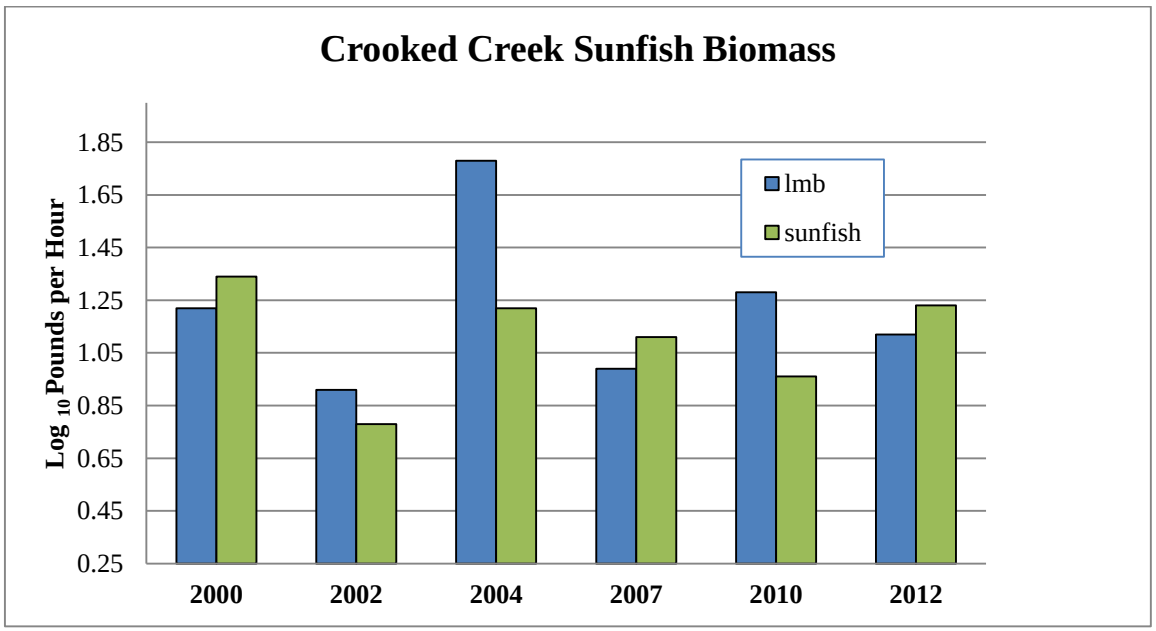

Figure 5. Log_{10} transformed CPUE (weight of fish) captured per hour of electrofishing in fall forage samples for Crooked Creek Reservoir, LA, from 2003 – 2012.

The Log_{10}-transformed CPUE (weight per hour) for largemouth bass and sunfish results from the forage sampling events is presented in Figure 5. It was appropriate to Log_{10} transform the largemouth bass and sunfish data sets due to the considerable variability in sample sizes, and the transformation resulted in a more normally distributed data set for graphic display. Except for a low CPUE in 2002, pounds of sunfish generally remained consistent over time. In 2004, bass CPUE (pounds per hour) exceeded that of sunfish, while in other years' bass and sunfish CPUE in pounds per hour were relatively similar.

The total pounds captured per hour by electrofishing were calculated for fall forage samples (Table 1). The majority of largemouth bass captured were greater than 6 inches TL. Overall, bluegill represent the main forage available to sportfish and other fish predators within Crooked Creek Reservoir. Other available forage includes longear, redear sunfish, and lake chubsuckers.

Table 1. Estimates of pounds per hour by electrofishing for all fish species captured during fall forage samples on Crooked Creek Reservoir, Louisiana.

Species	2000	2002	2004	2010	2012	2015	2017
LMB	16.8	8.19	24.5	19.3	13.2	0.53	1.86
Bluegill	6.9	4.5	13.5	4.6	7.2	3.0	7.94
Longear Sunfish	4.8	1.24	1.83	3.2	0	0	0.88
Redear Sunfish	3.7	0	0.18	1.29	8.5	0	1.70
Gizzard shad	0	2.4	1.7	0	0	6.10	0
Black Crappie	1.96	0	2.5	0.03	0	0.35	0
Golden Shiner	0	0	0.44	0	2.11	0.49	0.07
Warmouth	1.3	0.33	0.95	0	0	0	1.72
Lake chubsucker	0.63	0.30	1.57	0.36	1.18	0	0

Commercial

Commercial fish species and large sport fish in Crooked Creek Reservoir are sampled with entanglement gear. Monofilament gill nets are used to provide the data necessary to estimate size distribution and abundance (Table 2). Sample effort is determined by the surface area of the impoundment. A LDWF standardized gill net sample consists of the combined catch of 100 yard lengths of the following mesh sizes: 2.5 inches, 3 inches, 3.5 inches and 4 inches. Gill nets are set within one hour of sunset and retrieved as soon as possible after sunrise. Sets are restricted to the time period between December 1 and February 28. All fish captured are individually measured in total length to the nearest millimeter. Weights are measured to the nearest gram.

The most common species collected (2003, 2006, 2013 and 2016) have been common carp (*Cyprinus carpio*). Largemouth bass captured in gill nets have ranged in size from 16-22 inches TL. Triploid grass carp (TGC) were the most abundant fish captured in 2013 and 2016. TGC ranged in size from 19 – 39 inches TL.

Table 2. Total number of all fish species captured by gill net per year for Crooked Creek Reservoir, LA for 2003, 2006, 2013 and 2016.

Species	2003	2006	2013	2016
LMB	20	2	9	17
Common Carp	19	12	24	24
Black Crappie	4	0	2	10
Channel Catfish	0	1	4	6
Spotted Garfish	3	0	2	2
Bowfin	13	3	3	7
Gizzard Shad	2	0	17	3
Yellow Bullhead	5	1	1	4
Blue Catfish	1	0	0	0
Grass Carp	0	0	58	61
Total Fish	67	19	120	134

Water Quality-

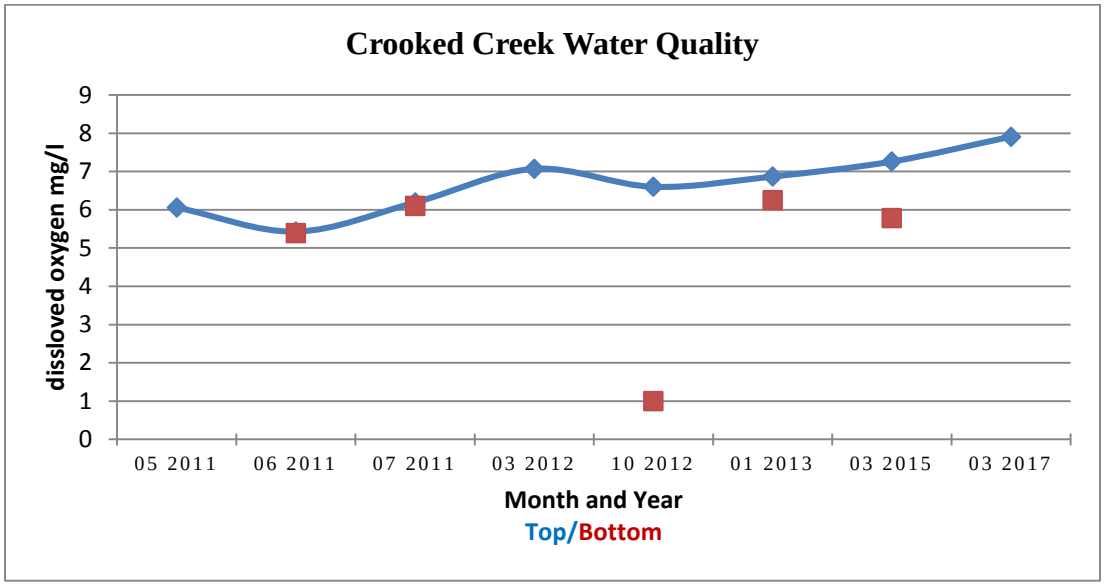

Figure 6. Dissolved oxygen measured in milligrams per liter (mg/l) in Crooked Creek Reservoir, LA, by month and year from 2011 – 2017.

Water quality parameters including dissolved oxygen, temperature, pH, conductivity and depths were taken during standardized samples and random site visits. Instantaneous dissolved oxygen (DO) levels have been above the EPA action level of 5.0 mg/l with one exception as shown in Figure 6. That one bottom reading measured 1.0 mg/l, which may be related to stratification due to warm water temperatures.

HABITAT EVALUATION

Aquatic Vegetation

2011

Hydrilla covered approximately 75% of the reservoir and was a serious impediment to boating activities. The Evangeline Parish Police Jury stocked 500 triploid grass carp (TGC) in 2008. LDWF stocked an additional 60 adult TGC in 2011.

2012

In September, watershield (40%), fanwort (40%) and coontail (20%) covered approximately 180 acres on the north and northeast end of the reservoir. Other plants included American lotus (15 acres), alligator weed (10 acres), water hyacinth (5 acres) and duckweed (8 acres) which made up a small percent of emergent and floating plant coverage.

2013

Crooked Creek continued to have a heavy infestation of watershield (*Brasenia schreberi*). A thick mat of this plant covered a large area north of the public swimming area. In June, water-shield (45%), fanwort (35%) and coontail (20%) covered approximately 200 acres. Other plants included American lotus (15 acres), alligator weed (10 acres), water hyacinth (5 acres) and duckweed (5 acres) which made up a small percent of emergent and floating plant coverage.

Hydrilla coverage decreased from 200 acres in 2012 to 150 acres in 2013. Follow-up evaluations of hydrilla will be conducted.

2014

During a site visit in November, watershield made up the majority of the vegetation observed in Crooked Creek. Approximately 75 acres of watershield was present. Other plants present included fanwort (15 acres), and coontail (25 acres). Water hyacinth, water lily, and duckweed (10 acres) comprised a small amount of emergent and floating plant coverage.

Hydrilla growth was noticeably less than in previous years. Coverage decreased from 200 acres in 2012 and 150 acres in 2013, to approximately 25 acres in 2014. This is most likely due to the triploid grass carp stockings that took place in the last few years (2008 - 2014).

2015

During a site visit in October, watershield made up the majority of the vegetation observed in Crooked Creek. Approximately 85 acres of watershield were present. Other plants present included fanwort (10 acres) and coontail (25 acres). Water hyacinth, water lily, and duckweed (10 acres) comprised a small amount of emergent and floating plant coverage. Also, giant salvinia was discovered in small patches on the north end of the lake.
Hydrilla growth has decreased considerably to approximately 10 acres in 2015. This is due to the triploid grass carp stockings that took place in the last few years (2008 - 2014).

2016
During a site visit in October, watershield and giant salvinia made up the majority of the vegetation observed in Crooked Creek. Approximately 100 acres of watershield and giant salvinia were present. Other plants present included fanwort (5 acres) and coontail (5 acres). Water hyacinth, water lily and duckweed (5 acres) comprised a small amount of emergent and floating plant coverage.

Submersed vegetation was considerably reduced due to grass carp stocking, especially hydrilla. No hydrilla was observed. Giant salvinia had noticeably increased throughout the lake.

2017
In November, giant salvinia made up the majority of the vegetation observed in Crooked Creek. Approximately 75 acres of giant salvinia was present. Other plants present included watershield (15 acres) and a mix of water hyacinth, water lily and duckweed (5 acres) that comprised a small amount of emergent and floating plant coverage.

Salvinia weevils (Brazilian) were released in Crooked Creek. A total of 11,718 adult weevils were released throughout the lake. LDWF collected these weevils from the LSU AgCenter St. Gabriel Research Station near Baton Rouge.

No submersed vegetation was observed throughout the lake due to grass carp stocking. The water was turbid which was likely due to no submersed vegetation and runoff from nearby timber harvest.

Substrate
Crooked Creek Reservoir is an open Reservoir with a hard sandy bottom. Surrounding the perimeter of the Reservoir is buttonbush (*Cephalanthus occidentalis*), Bald Cypress (*Taxodium distichum*) and black willow (*Salix nigra*), especially along the north and west shoreline.

CONDITION IMBALANCE / PROBLEM

Currently, aquatic vegetation is less than 20 percent throughout the complex. Submerged vegetation has not been observed due to the stocking of triploid grass carp. Other aquatic species present include water hyacinth, duckweed, watershield and giant salvinia. Giant salvinia continues to spread throughout the lake which will require continued maintenance control.

CORRECTIVE ACTION NEEDED

1. Overabundant aquatic vegetation (giant salvinia) should be controlled.

2. Follow-up sampling is necessary to determine effects of the TGC and giant salvinia weevil stockings.

RECOMMENDATIONS

1. Conduct chemical and biological treatments to nuisance aquatic plants as necessary in accordance with the LDWF Aquatic Herbicide Application Procedures.

2. Evaluate effects of previous triploid grass carp introductions through LDWF standardized sampling to determine abundance/longevity and site visits/type maps to assess submersed vegetation coverage.

3. Meet with Evangeline Parish Police Jury on an annual basis to discuss all management decisions as it relates to aquatic vegetation and fisheries.

4. Continue standardized fisheries sampling on Crooked Creek Reservoir every third year to monitor populations.